STATEMENT OF BASIS

Minor Air Quality Permit

Industrial Energy Applications, Inc
Sioux Falls, South Dakota

South Dakota
Department of Environment and Natural Resources

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1.0 BACKGROUND

On May 8, 1996, Industrial Energy Applications, Inc. (IEA) was issued a synthetic minor air quality operating permit (#28.0803-01S) for the operation of an emergency power generator in Sioux Falls, South Dakota. The diesel generator is used to generate electricity in an energy emergency and also during utility curtailments for Hy-Vee Store No. 1. For a short time in 2000, the name of the company was changed to Alliant Energy Integrated Services – Cogenex; however, in 2001, the facility was again named Industrial Energy Applications, Inc. (IEA). On March 12, 2001, IEA submitted an application to renew its synthetic minor air quality operating permit; it was reissued on June 11, 2004.

On January 29, 2009, the department received an application from IEA to renew its synthetic minor air quality operating permit. IEA's existing minor air quality operating permit expires June 11, 2009. Therefore, IEA has met the requirement in permit condition 3.2 to submit a renewal application at least 90 days before the existing permit expires. The renewal application is for Unit #1, an emergency power generator.

No complaints or violations have been filed against this facility since the initial air quality operating permit was issued on May 8, 1996.

2.0 OPERATIONAL DESCRIPTION

Industrial Energy Applications maintains and remotely operates an emergency power generator at 4101 South Louise Avenue in Sioux Falls, South Dakota for Hy-Vee Store No. 2. Table 2-1 displays a description of the existing permitted unit.

Table 2-1 – Description of Permitted Units, Operations, and Processes

Unit	Description	Maximum Operating Rate	Control Device
#1	Engine #1 – 1994 Caterpillar internal combustion engine and electric generator, Model #3508. The unit is fueled with distillate oil.	725 kilowatts, heat output	Not applicable

The diesel generator has an operational efficiency of 33%. Equation 2-1 converts the maximum design operating rate from kilowatts (heat output) to million Btus (MMBtu) per hour (heat input).

Equation 2-1: Converting from Heat Output to Heat Input

$$Maximum\ Capacity_{heat\ input} = \frac{heat\ output}{efficiency} kw \times conversion\ factor \frac{Btu}{hr - kw} \times \frac{MMBtus}{10^6\ Btus}$$

$$Maximum\ Capacity_{heat\ input} = \frac{725}{0.33} kw \times 3{,}413 \frac{Btu}{hr - kw} \times \frac{MMBtus}{10^6\ Btus}$$

$$Maximum\ Capacity_{heat\ input} = 7.5 \frac{MMBtus}{hr}$$

3.0 EMMISION FACTORS

Stationary internal combustion engines are classified by AP-42 – Fifth Edition according to their horsepower rating. A large stationary internal combustion engine is one that has a horsepower rating greater than 600 horsepower. Based on the application, the manufacturer's horsepower rating of Unit #1 is 972 horsepower. Therefore, the unit is classified as a large stationary internal combustion engine.

The air pollutant emission factors for large stationary internal combustion engines burning distillate oil are derived from AP-42 – Fifth Edition, Tables 3.4-1, 3.4-2, 3.4-3, and 3.4-4, October 1996. The emission factor for sulfur dioxide is based on a sulfur content of 0.05 percent by weight. The following emission factors are for large stationary internal combustion engines burning distillate oil:

- Total Suspended Particulate (TSP) = 0.1 pounds per MMBtu
- Particulate ≤ 10 microns in diameter (PM10) = 0.0573 pounds per MMBtu
- Sulfur Dioxide (SO_2) = 0.05 pounds per MMBtu
- Nitrogen Oxides (NO_X) = 3.2 pounds per MMBtu
- Volatile Organic Compounds (VOC) = 0.09 pounds per MMBtu
- Carbon Monoxide (CO) = 0.85 pounds per MMBtu
- Total Hazardous Air Pollutants (HAPs) = 1.49 E-03 pounds per MMBtu

IEA submitted manufacturer stack test data for a similar engine with the original permit application in March 1996. The stack test was based on burning distillate oil with a sulfur content greater than 0.05 percent by weight. The stack test data is converted from pounds per hour to pounds per MMBtu below for comparison to the emission factors listed in AP-42:

- TSP = 1.16 pounds per hour / 7.5 million Btus per hour
  = 0.15 pounds per MMBtu
- SO_2 = 1.60 pounds per hour / 7.5 million Btus per hour
  = 0.21 pounds per MMBtu

- NO_X = 29.524 pounds per hour / 7.5 million Btus per hour
  = 3.94 pounds per MMBtu
- VOC = 0.795 pounds per hour / 7.5 million Btus per hour
  = 0.11 pounds per MMBtu
- CO = 12.48 pounds per hour / 7.5 million Btus per hour
  = 1.66 pounds per MMBtu
- HAPs = 0.0145 pounds per hour / 7.5 million Btus per hour
  = 0.00193 pounds per MMBtu

Table 3-1 compares the emission factors based on AP-42 and the manufacturer's stack test data. IEA requested operational limitations to maintain its potential air emissions below the major source threshold under the Title V air quality permit program. Therefore, the emission factor that provides the greatest air emissions will be used to determine the potential emissions.

Table 3-1 – Comparison of Emission Factors (pounds per MMBtu)

Emission Factor	TSP	PM10	SO2	NOx	VOC	Total HAPs	CO
AP-42	0.1	0.06	0.05	3.2	0.09	0.00149	0.85
Manufacturer	0.2	-	0.21	3.9	0.11	0.00193	1.66

4.0 POTENTIAL EMISSIONS CALCULATIONS

Potential emissions for each applicable pollutant are calculated from the maximum design capacity listed in the application and assuming the unit operates every hour of every day of the year (8,760 hours per year). IEA does not have control equipment associated with the engine; therefore, the potential uncontrolled and controlled emissions are the same.

Equation 4-1 was used to calculate the potential emissions based on the greatest emission factor listed in Table 3-1 for each pollutant.

Equation 4-1: Potential Air Emissions

$$Potential\ Emissions \frac{tons}{yr} = heat\ input\ capacity \frac{MMBtu}{hr}\ x\ 8{,}760 \frac{hrs}{yr}\ x\ emission\ factor \frac{lbs}{MMBtu}\ x\ \frac{1\ ton}{2{,}000\ lbs}$$

Table 4-1 lists the potential emissions from Unit #1.

Table 4-1 – Potential Emissions

Unit	TSP (tons/yr)	PM10 (tons/yr)	SO_2 (tons/yr)	NO_X (tons/yr)	VOC (tons/yr)	Total HAPs (tons/yr)	CO (tons/yr)
#1	6.6	2.0	6.9	128	3.6	0.1	55

Presently, IEA is restricted to burning not more than 162,000 gallons of distillate oil per calendar year in the generator to maintain nitrogen oxide emissions below the major source threshold for the Title V air quality permit program. Equation 4-2 calculates the potential nitrogen oxide emissions based on the federally enforceable operational limit.

Equation 4-2: Nitrogen Oxide Emissions Based on Operational Limit

$$E_{NOx} = 162{,}000 \frac{gals}{yr} \; x \; 140{,}000 \frac{Btus}{gal} \; x \; \frac{MMBtus}{10^6 \, Btus} \; x \; 3.9 \frac{lbs}{MMBtus} \; / \; 2{,}000 \frac{lbs}{ton}$$

$$E_{NOx} = 44 \frac{tons}{yr}$$

The operational limit is sufficient to maintain potential nitrogen oxide emissions equal to or less than 50 tons per 12-month rolling period. A potential emission limit at this level will allow IEA to forgo an hourly emission limit for nitrogen oxide and stack testing requirements because the potential emissions are maintained below 50% of the major source threshold for the Title V air quality permit program.

5.0 PERMIT REQUIREMENTS

5.1 New Source Review

The Administrative Rules of South Dakota (ARSD) 74:36:10:01 notes that New Source Review (NSR) regulations apply to areas of the state which are designated as nonattainment pursuant to the Clean Air Act for any pollutant regulated under the Clean Air Act. The permitted unit is located within the city of Sioux Falls, SD, which is in attainment for all the pollutants regulated under the Clean Air Act. Therefore, IEA is not subject to NSR review.

5.2 Prevention of Significant Deterioration

Any stationary source which emits or has the potential to emit 250 tons per year or more of any air pollutant is considered a major source and subject to prevention of significant deterioration (PSD) requirements *(ARSD 74:36:09 – 40 C.F.R. Part 52.21(b)(1)).* Any stationary source which emits or has the potential to emit 100 tons per year or more of any air pollutant and is subject to

one of the 28 named PSD source categories is considered a major source and subject to PSD requirements *(ARSD 74:36:09 – 40 C.F.R. Part 52.21(b)(1)).*

The permitted unit is not one of the 28 named PSD source categories and does not have the potential to emit greater than 250 tons per year of any criteria pollutant. Therefore, the PSD program is not applicable to IEA.

5.3 New Source Performance Standards

The department reviewed the New Source Performance Standard (NSPS) under 40 CFR Part 60 and determined the following need to be reviewed further to determine if they are applicable.

5.3.1 40 CFR Part 60, Subpart IIII

The department determined that 40 CFR Part 60, Subpart IIII may be applicable. Subpart IIII is applicable to owners and operators of stationary compression ignition (CI) internal combustion engines (ICE) that:

i) Commence construction after July 11, 2005 where the stationary CI ICE are manufactured after April 1, 2006 and are not fire pump engines; or
ii) Modify or reconstruct their stationary CI ICE after July 11, 2005.

In accordance with 40 CFR §60.4219, a compression ignition means a type of stationary internal combustion engine that is not spark ignition engine. A spark ignition engine is an engine that uses gasoline, natural gas or liquefied petroleum. IEA's generator is not considered a spark ignition engine as the fuel source is diesel fuel. IEA's generator is a stationary CI ICE and not a fire pump engine; however, it was constructed before 2005 and has not been modified. Therefore, Subpart IIII is not applicable to IEA.

5.4 National Emissions Standards for Hazardous Air Pollutants

The department reviewed the National Emissions Standards for Hazardous Air Pollutants (NESHAP) under 40 CFR Part 61 and determined one Maximum Achievable Control Technology (MACT) standard needs to be reviewed further to determine if it is applicable.

5.4.1 40 CFR Part 63, Subpart ZZZZ

The department determined that 40 CFR Part 63, Subpart ZZZZ may be applicable. Subpart ZZZZ is applicable to owners or operators of a stationary Reciprocating Combustion Engine (RICE) at a major and area source of HAP emissions. A stationary RICE is any internal combustion engine which uses reciprocating motion to convert heat energy into mechanical work and which is not mobile. A major source of HAP emissions is a plant site that emits or has the potential to emit any single HAP at a rate of 10 tons or more per year or any combination of

HAP at a rate of 25 tons or more per year. IEA's permitted unit is not a major source of HAP; however, IEA is an area source of HAP.

As noted in 40 CFR §63.6590(a)(2)(iii), a stationary RICE located at an area source of HAP emissions is new if construction of the stationary RICE was commenced on or after June 12, 2006. IEA's generator was installed before 2006; therefore, Subpart ZZZZ is not applicable to IEA.

5.5 Acid Rain Program

In accordance with 40 C.F.R, Part 72, §72.6(b) (8), acid rain requirements do not apply to a non-utility unit. A utility unit is defined as a unit owned or operated by a utility that serves a generator which produces electricity for sale. A generator is defined as a device that produces electricity and was or would have been required to be reported as a generating unit pursuant to the United States Department of Energy Form 860. However, Unit #1 is considered a non-utility unit and, therefore, is not subject to acid rain requirements.

5.6 State Requirements

5.6.1 State Emissions Limits

Particulate and sulfur dioxide emission limits are derived from the Administrative Rules of South Dakota (ARSD) 74:36:06. In accordance with ARSD 74:36:06:02, the allowable emissions for a fuel burning unit less than 10 million Btus per hour heat input are listed below:

- TSP = 0.6 pounds per million Btu heat input; and
- SO_2 = 3.0 pounds per million Btus heat input.

The sulfur dioxide emission limit is based on a three-hour rolling average, which is the arithmetic average of three contiguous one-hour periods.

Table 5-1 compares the potential emission rate to the state emission limit for Unit #1.

Table 5-1 – Potential Emission Rate versus State Emission Limit

Pollutant	Potential Rate	State Emission Limit
TSP	0.2 pounds per million Btus	0.6 pounds per million Btus
SO_2	0.21 pounds per million Btus	3.0 pounds per million Btus

Based on the comparison, IEA is capable of operating in compliance with the state air emission limits.

Equations 5-1 and 5-2 calculate TSP and sulfur dioxide emissions based on the state's emission limits and the distillate oil limit to ensure the particulate and sulfur dioxide emission allowed by the permit do not exceed the major source threshold for the Title V air quality permit program, respectively.

Equation 5-1: TSP Emissions Based on Allowable and Operational Limit

$$E_{TSP} = 162{,}000 \frac{gals}{yr} \; x \; 140{,}000 \frac{Btus}{gal} \; x \; \frac{MMBtus}{10^6 \, Btus} \; x \; 0.6 \frac{lbs}{MMBtus} \; / \; 2{,}000 \frac{lbs}{ton}$$

$$E_{TSP} = 6.8 \; tons / year$$

Equation 5-2: SO_2 Emissions Based on Allowable Limit

$$E_{SO_2} = 162{,}000 \frac{gals}{yr} \; x \; 140{,}000 \frac{Btus}{gal} \; x \; \frac{MMBtus}{10^6 \, Btus} \; x \; 3.0 \frac{lbs}{MMBtu} \; / \; 2{,}000 \frac{lbs}{ton}$$

$$E_{SO_2} = 34 \; tons / year$$

The state allowable emission limits combined with the operational limit for particulate and sulfur dioxide will not allow Industrial Energy Applications to emit greater than 50 tons of each pollutant per 12-month rolling period.

5.6.2 State Restrictions on Visible Emissions

Visible emissions are applicable to any unit that discharges to the ambient air. In accordance with ARSD 74:36:12, a facility may not discharge into the ambient air more than 20 percent opacity for all units. IEA must control the opacity at less than 20 percent for the generator.

5.7 Summary of Applicable Requirements

IEA was issued a minor air quality permit with operational limits which maintain nitrogen oxide emissions below the major source threshold under the Title V air quality permit program. A minor source is defined as any source with the potential to emit less than 100 tons per year of a criteria pollutant. A source operating in South Dakota that meets the definition of a minor source is required to obtain a minor air quality permit under ARSD 74:36:04. IEA will be required to operate within the requirements stipulated in the following regulations under the minor permit program:

- ARSD 74:36:04 – Operating Permits for Minor Sources;
- ARSD 74:36:06 – Regulated Air Pollutant Emissions; and,
- ARSD 74:36:12 – Control of Visible Emissions.

6.0 RECOMENDATION

Based on the information submitted in the air quality permit application, the department recommends conditional approval of a minor air quality permit for International Energy Applications, Inc to operate in Sioux Falls, South Dakota. Any questions pertaining to this permit recommendation should be directed to Jill Riedel, Natural Resources Engineer.